Monthly Review

Federal Reserve Bank of Boston

CONNECTICUT RIVER VALLEY FROM SUGARLOAF MOUNTAIN

Agriculture in the Connecticut River Country

Farmers in the Connecticut River Country have a rich heritage of fine farmland and farming experience. More than 250 years ago, farmers in the valley prospered in foreign trade by shipping abroad a wide variety of agricultural products. A gradual shift toward crop specialization accompanied the increase in trade during the early 1800's. Following the Civil War, industrial activity in the valley increased markedly and the farmers turned to markets in the expanding urban centers. Growing industrialization continues to provide an opportunity for farmers in the Connecticut River Country to serve their urban neighbors.

FROM ITS ORIGIN in northern New Hampshire at the First Connecticut Lake, the Connecticut River flows 400 miles southward to Long Island Sound through fertile farmland, wood-covered hillsides, and thriving industrial cities. During the first 230 miles of its southward trip the river does double duty by marking state and county boundaries. It flows along between four counties in New Hampshire and five counties in Vermont. During the rest of its course the river bisects three Massachusetts counties and two Connecticut counties. This valley and the hillsides of the adjacent counties, excluding New London County in Connecticut, are known as the Connecticut River Country. It is a land rich in agriculture, industry, and tradition.

The first settlers moved into the valley in 1635, and for the first 50 years self-sufficient farming was the general rule. By 1700, however, farmers were taking advantage of the inexpensive, easy transportation offered by the river and had begun to export some agricultural commodities, including tobacco.

Thus started the first transition in the region's agriculture. Changes occurred slowly, and historians report that it was not until the beginning of the 19th century that the volume of exports from the valley became important. At that time the valley and foothill farmers were carrying on active river and seaborne export trade with Boston, New York, the southern coastal states, the West Indies, Ireland and England, as well as occasional trade with Mediterranean ports. Probably the largest exports were tobacco and potatoes.

Early in the 1800's barter was still common. Nearly every farmer had a small patch of flax, and newspaper advertisements of the day proclaimed that flax and flaxseed were among the few farm products that could be traded for money alone.

In the last half of the 1800's, a second transition in the valley's agriculture began, a shift from diversified general farming to specialization. The three Connecticut River counties in Massachusetts—Franklin, Hampshire and Hampden—assumed the lead in onion production. According to the earliest available figures, 32,611 bushels of onions were raised there in 1815. By 1885 onion production had reached 61,391 bushels, and 10 years later it had soared to 342,259 bushels.

Even that rate of growth was surpassed by the tobacco industry. Tobacco production soared from 537,649 pounds in 1840 to 9,266,445 pounds in 1860 and 15,870,399 pounds in 1870. Not everyone welcomed this industry. Writing in 1866, an Easthampton, Massachusetts, historian commented: "The value of the tobacco crop, we are sorry to say, exceeds that of any other. We sincerely hope the day may not be distant when our most fertile fields may be devoted to the production of some crops useful rather than deleterious to man."[1] The wish of this historian has never been

[1]Lyman, P., *History of Easthampton* (Northampton, Massachusetts, Trumbull and Gere, 1866).

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fulfilled. Tobacco today returns a higher income per acre than any other crop grown in New England.

Accompanying the transition to crop specialization was a shift of markets from export to local urban consumption. Following the Civil War, industry became increasingly important in the economy of the Connecticut River Country. As industrial employment increased, agricultural produce found an expanding market in the growing urban centers.

According to the Census of 1850, there were 441,706 people living in the Connecticut River Country. By 1900 the population had increased to 743,149; by 1940 it totaled 1,208,401. The high birth rate and the migration of workers and their families into the area to man the region's expanding manufacturing industry in the 1940's caused population to increase by 13.6 per cent, to reach 1,372,264 persons in 1950.

For a whole century, crop specialization and a shift to urban markets have been the dominant trends. Today, specialization is the general rule for the larger farms in the area, and with the exception of tobacco and milk the bulk of its products are consumed in the area.

Of the 7,352,320 acres in the Connecticut River Country, 2,862,421 acres are in farms. This is approximately 23 per cent of all farmland in New England. The 1950 Census lists 21,642 farms in the area, of which 58 per cent are classified as commercial, 14 per cent as part-time, and 28 per cent as residential. The large proportion of part-time and residential farms indicates the industrial employment opportunities available to people in rural sections of the valley.

Farmers in the Connecticut River Country received $125 million of agricultural income in 1949, 23.5 per cent of New England's total income from this source. This achievement results from the extensive type of agriculture found in the northern counties, and the intensive use of land in the Massachusetts and Connecticut river counties. The 10,000 farms in the five river counties of Massachusetts and Connecticut raised products valued at $85 million compared to products totaling $40 million raised on the 12,000 farms in the nine river counties in Vermont and New Hampshire.

The valley's principal sources of farm income are dairy products, tobacco, potatoes, truck crops, and poultry. In general, the more fertile and higher-priced land is located near the river. The crops having a high dollar value per acre are raised in the valley while the crops of lower value are grown in the foothills. This is especially true in the southern portions of the valley where tobacco is the predominant crop, while farther away from the river there is more emphasis on potatoes, dairy products and poultry.

The Bureau of the Census selects the 100 leading counties in the United States according to achievements in specific farm activities. The 1950 Census places Hartford County, Connecticut, among the 100 leading counties 16 times; Franklin and Hampshire Counties, Massachusetts, three times each; and Middlesex County, Connecticut, once.

Tobacco Valley

Tobacco is clearly the most famous agricultural product of the Connecticut River Valley. The area on both sides of the river from the southern borders of Vermont and New Hampshire down to Portland, Connecticut, is frequently called Tobacco Valley. In this small area farmers produce cigar tobacco which in 1951 sold for $32.5 million.

The valley farmers cultivated 25,172 acres of tobacco in 1949. Approximately one-third of the acreage was located in Massachusetts and two-thirds in Hartford County, Connecticut. The soil type in Middlesex County, Connecticut, is not suitable for tobacco culture.

For the most part Havana Seed tobacco is raised in Massachusetts, Broadleaf tobacco on the east side of

the river in Connecticut, and both varieties on the west side of the river in Connecticut. A large proportion of the nation's Shade tobacco is produced in Hartford County. Outdoor tobacco is used primarily as binders, while Shade is used almost exclusively for wrappers.

In the late 1890's, cigar manufacturers were turning to Sumatra for their wrappers, as the Sumatra leaf was thinner, more finely textured, and the flavor was more neutral. Through experiments by the United States Department of Agriculture and the Connecticut Agricultural Experiment Station, it was found that Connecticut Valley farmers could raise wrapper tobacco with the same qualities as the Sumatra leaf by simulating the climatic conditions of Sumatra.

To do this, huge cheese-cloth tents are erected over the fields. Contrary to common belief, this cloth is not to protect the plants from hail and insects, but to create an even temperature, high humidity, and shade similar to that naturally found in Sumatra. The use of tents greatly increases production costs. For instance, it takes 5,000 yards of cloth per acre and most of it must be replaced annually. To produce the cotton for the cloth to cover one acre of tobacco, a southern farmer must raise one acre of cotton.

Ten large tobacco corporations produce about 75 per cent of the Shade tobacco. A large share of the fields are owned by these interests, but they lease land and contract with farmers as well. Conversely, outdoor tobacco is raised almost entirely by individual growers.

In the entire field of agriculture, there are few undertakings that require as much hand labor as does tobacco. This creates a real problem in this highly industrialized area where competition makes labor scarce and expensive.

The tobacco growers are keenly conscious of this problem. By recruiting local and southern school children, 14 years and older, and Puerto Ricans, the Shade Growers Association helps its members to obtain approximately 15,000 seasonal workers to supplement the 5,000 year-round full-time workers.

The current tobacco production of the Connecticut Valley is greater than its domestic consumption. Since the end of World War II, a substantial portion of the crop has been exported or purchased by the Federal Government through non-recourse loans under the Price Support Law. As foreign competition strengthens in United States and foreign markets, the valley's tobacco growers must find new markets or curtail production.

While tobacco is the predominant crop near the river, potatoes are the leading cash crop in the southern hill country. There is also considerable potato acreage on the valley floor.

Two counties in the Connecticut River Country are among the 100 leading counties of the United States for potato acreage and production. Hartford County ranks 59th in acreage planted and 65th in bushels harvested. Hampshire County ranks 89th in acreage planted and 81st in bushels harvested. In 1949 these two counties produced 47 per cent of all the potatoes in the Connecticut River Country. The remaining production was scattered along the rest of the river. Production per acre in 1949 was 264 bushels, compared to 474 bushels per acre for the valley's chief competitor, Aroostook County. While these are only one year's figures, they do indicate the tremendous yield advantage that Aroostook has over the valley.

Partially offsetting the yield advantage of Aroostook County, however, is the valley's proximity to markets and its stone-free soil on the valley floor. The freeness from stones enables potato growers to use machinery for all potato-growing and harvesting operations. In Aroostook County, the stones in the soil make it necessary to use hand labor to pick the potatoes after they are dug.

Prior to World War II most of the potatoes raised in the Connecticut Valley had to move to market before freezing weather because frost-free storage was limited. Under the price support law that was in effect through the 1950 crop, the support price of potatoes was based on a sliding scale that was higher in the spring than at harvest time. This was to encourage orderly marketing, but in the Connecticut River Country it provided enough additional incentive so that many constructed frost-free storage, either by building new facilities or by remodeling existing barns and tobacco sheds.

Market Season Lengthens

With this frost-free storage available, the marketing pattern of the area has changed. Instead of moving the crop to market almost completely by Christmastime, a large proportion is held and marketed in direct competition with Maine potatoes during the first three months of the year. Because of the freight advantage, valley potatoes now sell in local markets at a lower price than those shipped in from competing areas. Marketing men, close to the industry, feel that valley producers must strive to improve grading techniques and put better quality potatoes on the market. One spokesman has indicated that with an improved grading program, producers in the valley area could successfully meet competition at equal prices.

While not as important as potatoes or tobacco, onion production in the Connecticut River Valley is significant. Centralized in a relatively small area in Hampshire and Franklin Counties, Massachusetts, the industry today is not as large or prosperous as it was 15 years ago. For instance, in 1940 there were over 5,000 acres in onions; by 1952, plantings had plunged to about 700 acres.

There have been two prime reasons for this decline. Onions require a great deal of hand labor. This has been increasingly difficult and expensive to obtain. A second reason has been the inability of producers to control thrip, an insect that thrives on onions. A recently developed insecticide holds promise of controlling this insect, and mechanization is reducing labor needs. With these two developments, growers may be able to increase acreages. In some communities there is considerable interest among onion producers in the possibilities of raising seed onions.

In Massachusetts and Connecticut, truck crop farmers utilize the rich valley floor to produce vegetables for the nearby urban centers. Some grow a wide range of vegetables, while others specialize in one item such as carrots or beets. In the hill towns, where the season is later, farmers raise some small fruits and vegetables to come on the market after the peak of local marketings, and thus capitalize on premium prices for off-season

produce. Throughout the area the trend toward roadside selling has been upward. Marketing specialists feel that much needs to be done to increase the attractiveness and efficiency of these stands.

Fruit is relatively unimportant in the area, especially in the northern part. However, the 1950 Census lists Franklin County, Massachusetts, as ranking 90th among all counties in the nation in the number of apple trees and 94th in bushels of apples harvested. Hartford County, Connecticut, is listed as 61st in number of trees, and 48th in bushels of apples harvested. Also, Hartford County is 67th both in number of pear trees and bushels of pears harvested.

Dairying is an important farm enterprise throughout the northern counties and in the hill towns of the southern counties in the Connecticut River Valley. The Census reported 13,092 farms in the valley that had 104,423 milk cows in 1949. Sales of dairy products amounted to $41 million in the same year. During the fall months, when production is low, most of the milk is sold as fluid milk in the urban centers of the Connecticut River area and in Metropolitan Boston. In the spring, when milk is in surplus, a large proportion of the milk is used in manufactured dairy products.

Improved technology has had a tremendous influence on milk production in the nation. Connecticut River Valley farmers have shared in the trends toward increased use of lime and fertilizer and use of improved varieties of seed on pastures and haylands. These changes have greatly improved the roughage fed to dairy cows. Improved roughage, together with the widespread use of artificial insemination, has enabled dairymen to increase total milk production while cow numbers decreased. During 1952 this downward trend in the number of cows was reversed in New England and the nation alike.

Milk has traditionally been cooled in milk cans in a water-bath cooler with daily collection from the farm by a milk hauler. At present a revolutionary method of milk cooling, storage, and pickup is spreading through New England. Introduced into Connecticut from the West, bulk farm cooling tanks may change the entire milk handling system of Connecticut and other New England dairy farmers. The initial cost of the new bulk cooling tanks is a sizable amount. For a large dairy, the cost per hundredweight of milk produced is smaller than that for a small producer. Even though small bulk cooling tanks are now available, the additional capital outlay required to purchase a bulk cooling tank and the economy of large-sized operations may be the final straws that will cause some of the smaller producers in the area to go out of business.

Poultry production is not as prevalent on the fertile fields near the river as it is in the foothills. On the poorer soil, more distant from the river, poultry enterprises are found along the entire length of the river. In 1949, farms in the area sold $17 million worth of poultry and poultry products. Of this, 58 per cent was from the sale of eggs. While there is a small hatching-egg business in the valley, the majority of these eggs were market eggs. Receipts from the sale of cockerels and fowl make up most of the remaining 42 per cent of poultry and poultry product sales.

The Connecticut River Country has a favorable prospect for continued industrial growth and urban development. Many farmers in the area will be constantly faced with increasing competition for their land. The competition will be greatest for the best land, as industry and suburban developers prefer land that is fairly level. The increased land values will undoubtedly enable many to sell their farmland at substantial profits. Those who do not wish to sell may be hard-pressed as their land is reclassified and assessed as residential or industrial land.

The basic strength of the valley's economy in the past has been growing industrialization, and this will probably continue to be the case. With new and expanding industries attracting new families to the region, the demand for agricultural products is increasing and will undoubtedly continue to increase. The preference of consumers for local produce and the area's freight advantage in reaching its own markets presents Connecticut River Country farmers with an opportunity to capitalize on the growth of urban population.

FARM PRODUCTS OF THE CONNECTICUT RIVER COUNTRY — 1949
(Thousands of Dollars)

	Poultry & Products	*Dairy Products*	*Other Livestock & Products*	*Tobacco*	*Potatoes*	*All Other Vegetables*	*Forest Products*	*All Farm Products**
New Hampshire								
Coos	196	1,833	390		397	31	159	3,101
Grafton	938	2,729	664		158	47	255	5,026
Sullivan	573	1,075	401		71	21	87	2,309
Cheshire	1,333	1,337	312		94	12	73	3,353
Vermont								
Essex	43	816	166		152	10	124	1,337
Caledonia	428	5,016	906		199	14	295	7,014
Orange	593	4,419	857		81	30	233	6,396
Windsor	915	4,484	886		60	10	353	7,017
Windham	664	2,257	760		64	45	341	4,601
Massachusetts								
Franklin	1,295	3,265	546	2,526	631	225	205	9,095
Hampshire	2,152	3,246	767	4,916	910	534	109	13,694
Hampden	2,025	1,899	444	4,853	388	417	34	11,131
Connecticut								
Hartford	3,392	6,428	1,458	27,200	1,155	896	30	43,271
Middlesex	2,406	1,897	307	46	45	39	21	7,410
Total — Connecticut River Country†	16,952	40,700	8,864	39,541	4,406	2,330	2,318	124,753
Total — New England	**128,055**	**183,023**	**40,211**	**40,750**	**64,710**	**12,316**	**10,019**	**531,706**

*Total farm products sold includes value of products not shown on this table.
†Items may not add to totals due to rounding.

Source: U. S. Bureau of the Census.

Monthly Review
FEDERAL RESERVE BANK OF BOSTON

PLANNED INDUSTRIAL CENTERS:

Redeveloping Existing Facilities

(This is the second in a series of articles describing planned industrial centers in New England. A third article will consider organizations which developed vacant land into industrial centers. A general discussion of the need for planned industrial centers, their nature, operating techniques, sponsors, and advantages appeared in the February 1953 Monthly Review.)

FOUR INDUSTRIAL CENTERS have been organized in New England to make use of sites and buildings originally developed for government purposes and left idle at the end of World War II. They differ from the usual planned industrial center in that useful buildings, in addition to all necessary utilities, such as roads, railroad spurs, and water and sewer lines, were already in existence when the center was first made available as a location for individual manufacturing and distributing firms. The development groups generally had to repair the buildings and utilities, however, before offering them to individual concerns.

Acting in response to requests from residents of Portland and South Portland, in 1946 the Maine state legislature created the Greater Portland Public Development Commission as a quasi-public nonprofit organization. The Commission was authorized to acquire the wartime South Portland shipyard and sell or lease land and buildings in the yard. The governor appointed five commissioners who donate their time and efforts as a public service. The legislature has appropriated no public funds for the Commission. In 1946 the Commission purchased the 65-acre West Yard from the Federal Government on a mortgage basis. It obtained its initial working capital by salvaging materials left in the Yard and by selling a small part of the property. The Commission quickly succeeded in leasing space and has plowed most of its rental income back into repairs and improvements to its buildings.

The West Yard contains 17 buildings with 400,000 square feet of space. Most of this space was occupied by 1950. At that time the Development Commission had an opportunity to sell part of its unused land for construction of an oil terminal. From the proceeds of the sale and additional amounts accumulated from rental revenue, it paid off the 10-year $550,000 mortgage on the West Yard and made a down payment on the 45-acre East Yard. The East Yard contains 500,000 square feet of manufacturing space in 15 buildings. By 1952, the Commission had leased all of this space.

About 40 diversified manufacturing and distributing concerns now use the 32 buildings in both sections of the old shipyard. They employ up to 2,000 workers during the peak season of the food-processing concerns. Most of the firms occupy space on a lease basis, but the concerns using buildings mainly for storage purposes are tenants-at-will. It is possible for the Development Commission to replace them with manufacturing firms that want to locate in the district when the opportunity arises. This policy emphasizes the public nature of the Commission. It is more concerned with increasing the number of manufacturing jobs in the Portland area than with making profits.

While the other organizations which redeveloped groups of vacant buildings were formed by private individuals who looked for profits from their investments, all have taken a long-range view in their policies. They have not sought short-term profits from activities that eventually might be detrimental to the area. Instead, they have tried to encourage the establishment of sound industrial concerns in their centers. They realize that both they and the local economy will benefit most from an increased number of jobs in basic industries.

A Distributor Expands

An industrial center known as Thompson's Point was established on the west side of Portland, Maine, in 1945. Utilities Distributors, Inc., a leading distributor of bottled gas and appliances, formed this center from a surplus government bomb manufacturing installation. The concern wanted two of the 14 surplus buildings for its own use. To assure orderly development of the area and to protect its own investment, it bought for $500,000 the entire 50-acre tract of land and the 14 existing buildings containing 280,000 square feet of space.

All utilities such as roads, railroad spurs, electricity, and water lines were already installed and were in good repair. Most of the buildings were also in good shape. While the developers did not have to invest much in rehabilitation of utilities and buildings, they have spent considerable sums to modernize and adapt them to the needs of tenants and to keep them in good repair.

Fifteen concerns now lease buildings in the Thompson's Point Industrial Center. The developers maintain the buildings occupied by about half the tenant concerns. The others occupy buildings on a net lease basis.

The industrial center has constructed five small buildings for tenants on long-term leases and is willing to build additional plants for suitable concerns. It has built a central cafeteria to serve the 400 employees of all firms in the district. It also maintains a central boiler plant which supplies heat and steam to tenants at cost. In addition, the industrial center furnishes police protection and janitor, mail and snow removal service. These central services enable the small concerns located in the area to enjoy many of the conveniences and economies usually available only to large concerns.

Many of the activities of the Harborside Industrial Park in Providence, Rhode Island, and the Hingham (Massachusetts) Management Corporation are quite similar. Both groups took over former government shipyards in 1950. The methods of acquisition differed,

however. The Hingham Management Corporation leased the Hingham shipyard from the Navy on a 15-year lease with a 90-day recapture clause. Harborside Industrial Park purchased the former Walsh-Kaiser shipyard for $410,000.

Both the Hingham and Providence developers have spent large amounts to renovate buildings and utilities. Many buildings had to be painted and rewired, and some were insulated and subdivided. Both groups have plowed back practically all their rental revenue to repair, maintain, and improve the properties. The Hingham Management Corporation has reinvested about $600,000 and the Harborside Industrial Park approximately $540,000 in these activities.

Harborside Industrial Park and the Hingham Management Corporation have leased manufacturing, storage, and office space. Both centers contain former administration buildings which are being used for office space. Harborside Industrial Park has two enormous, high-ceiling buildings which were built for special purposes. The Hingham Yard contains a similar 450,000 square foot building. Both developers have found it difficult to locate manufacturing tenants for these buildings. The Hingham Management Corporation, however, recently leased part of its large building to an international electrical manufacturing concern, and it is understood that negotiations for full occupancy will be completed soon.

Both industrial centers maintain crews of painters, electricians, plumbers, steamfitters, watchmen, and janitors to keep the property in good repair. The Hingham Management Corporation has a maintenance staff of 45 men. Harborside employs 15 workers. Both districts provide heat and process steam to tenants and have central cafeterias. These services lower costs for tenant concerns. Harborside Industrial Park has five trucking terminals located within the district. Hingham has its own fire department.

The Hingham shipyard covers 297 acres of land, has 19 miles of railroad spurs, and contains 67 buildings with 1,100,000 square feet of space. All except eight of the 67 buildings are now at least partially occupied. A total of 52 light manufacturing and distributing concerns lease space in the yard. They employ approximately 2,500 persons and have greatly reduced the local unemployment problem.

The Hingham Corporation has followed a policy of bringing a wide range of industries into the yard to protect itself against possible loss in case of depressed conditions in particular industries and to contribute to the employment stability of the area. It will not lease space to more than three concerns in the same industry. As a result of the corporation's diversification policy, firms in the Hingham yard represent a wide range of activity, including manufacturers in the machinery, chemical, electronics, ordnance, textile, furniture, paper, and shipbuilding industries. Many types of distributors are also represented. Some concerns lease space for storage purposes. A number of business firms rent offices in the former administration buildings, as does the Federal Government.

Many tenants are new concerns that started operations in Hingham. Others have taken space in the yard to enable them to expand when their original facilities became inadequate. A few firms have transferred to Hingham from other locations to obtain more space and less crowded conditions.

Harborside Industrial Park has also attracted diversified concerns into its nearly 1,000,000 square feet of space. In two years it has become a busy industrial center. Sixty-seven firms now lease space in the 45 buildings of the 137-acre industrial district. These companies employ about 3,300 workers.

Most of the tenants have long-term leases. The two largest buildings, however, are occupied on 30-day leases. At present they are only partially used, for storage purposes. Harborside does not give long-term leases to the concerns using this space, so that the buildings will be available for manufacturing purposes if suitable tenants can be found.

Most of the existing plant space in Harborside Industrial Park is now used. Over half of the land, however, is not now occupied by buildings. Consequently, the developers stand ready to lease land to concerns that want to build their own plants in the industrial center in conformance with the center's over-all plans. If the firm prefers, the development group will design and build plants to the specifications of suitable tenants on a long-term lease basis. It is starting the first new building under this plan. The Park will not sell land outright. The owners want to maintain close control over the whole area to insure its orderly development. Tenants are screened to determine their suitability to the area. The Park will not lease space to firms which would be objectionable to other concerns in the center or to the nearby residential area.

Community Cooperation

Initial opposition of primarily residential communities to the establishment of industries can be understood in view of frequent haphazard industrial development in the past. But when the purposes and operating techniques of planned industrial centers have been explained to local residents and municipal officials, objections have generally disappeared.

Local manufacturers, bankers, other businessmen, and municipal officials have been extremely helpful in aiding the growth of industrial centers in the Portland area. Groups in Providence have also recognized the importance of new jobs and have cooperated in building Harborside Industrial Park into a thriving center.

New England communities are beginning to realize that local attitudes toward industry have an important influence on location decisions. Most concerns make sure they are wanted in a particular area before locating there. There are many examples of communities that were favorably considered, but which were by-passed because local attitudes toward the firm were not enthusiastic. New England communities have few natural advantages to attract manufacturers. They are recognizing that natural obstacles may be offset by cooperating to the fullest extent with developers and manufacturers to promote industrial growth. Few things could be worse for the future prosperity of the region than placing man-made obstacles in the way of industrial development. Where such obstacles exist, enlightened self-interest may stimulate efforts to remove them and build up a favorable atmosphere for industrial growth.

INDUSTRIAL OPPORTUNITIES IN NEW ENGLAND:

Instruments

THE DEVELOPMENT AND MANUFACTURE of scientific and professional instruments is particularly well adapted to New England. Raw material and shipping costs are relatively unimportant, and the industry relies on technically trained people as well as skilled labor. The industry faces a great challenge in making the best possible use of the superior technological capacities in the New England area.

New England has approximately 250 establishments engaged in the manufacture of instruments and related products. The industry is one of the region's smallest, representing only 2.5 per cent of the total value added by manufacturing in New England in 1947. It holds considerable promise for the future, however, as it is growing rapidly.

The growing relationships between instruments and electronic devices make it difficult to draw hard and fast boundaries around the instrument industry. This article will concentrate on instruments which are primarily neither electronic in nature nor used to measure or control electrical quantities. This complex industry group includes scientific and engineering instruments; measuring and controlling instruments; medical and dental instruments; optical instruments and ophthalmic goods; photographic equipment; and watches, clocks and timing devices.

The Industry in New England

There are noteworthy New England products in almost every branch of the instrument industry. In the field of **scientific research instruments and devices,** New England has producers of transits, levels, seismographs, gyroscopes, vibration isolators, and high-strength electromagnets. Worthy of particular mention are high-vacuum research instruments and electrostatic accelerators for electron-beam sterilization of foods and pharmaceuticals. Equipment is also being manufactured for another new field called "cryogenics," the study of phenomena at temperatures near absolute zero.

Among the wide variety of **instruments for indicating, recording, measuring, and controlling** are dial pressure gauges, thermostats and thermocouples, flow meters and controllers, and liquid-level gauges. In the industrial field, apparatus is being made for testing the physical properties of hardness, tension, elasticity and torsion. Approximately sixty companies are active in this field, manufacturing a tremendous diversity of old and new products. There is increasing reliance on electronic devices to permit the design of more accurate and smaller equipment. In general, New England possesses an excellent base for continued growth in this direction, due to its activities in electronics.

Surgical and medical instruments, such as scissors, knives, hypodermic needles, syringes, electrocardiographs, centrifuges, electro-physiological brain-wave analyzers, flame photometers, resuscitators, oxygen inhalation equipment, micromanipulators, and operating tables are produced in the region. New England is noted for the production of iron lungs, which are manufactured by Warren E. Collins, Inc., and the J. H. Emerson Company. The O. E. M. Corporation has a strong national position in oxygen inhalation equipment. The Barnstead Still and Sterilizer Company, Inc., is active in the manufacture of sterilizer and distillation equipment. Of special interest is the Harvard Apparatus Company, one of the few firms in the country producing medical teaching apparatus.

Many firms are engaged in the production of **surgical and orthopedic appliances and supplies,** such as surgical dressings, gauze, adhesive plasters, sanitary napkins, elastic stockings, sutures, and artificial limbs. Kendall Mills and Chicopee Manufacturing Company are predominant in surgical textile production.

New England manufacturers serve the **dental field** with dental materials, dies and plastics, dental disks and filling materials. One firm, the Myerson Tooth Corporation, is noteworthy in the production of artificial teeth and in experimentation with new plastic materials for such products.

A few New England producers make a variety of optical lenses and prisms, fused quartz for optical purposes, magnifiers, and other **precision optical devices.** Leaders in the field of spectrometry are Baird Associates, Inc., and Perkin-Elmer Corporation. The Polaroid Corporation makes a range of light-polarizing materials. The largest single manufacturer in the optical field in New England is the American Optical Company.

Over thirty companies produce **ophthalmic goods,** such as ground ophthalmic lenses and eyeglass frames. American Optical is also extremely important in this field, with new products being introduced continually. A recent advance has been the development of a plastic safety lens with high impact resistance.

Although this region does not have any of the large-scale producers of photographic apparatus, there are producers of still, motion picture and miniature **cameras** and photocopy devices. One of the greatest strides in still camera technology has been the introduction of the Land Camera by Polaroid Corporation.

New England accounts for a substantial percentage of the total United States activity in the manufacture of electric and nonelectric **clocks, watches, mechanisms for clockwork-operated devices,** and clock and watch parts. Large firms such as Waltham Watch, E. Ingraham Company, the U. S. Time Corporation, Benrus Watch Company, and Telechron, Inc., have brand names well known throughout the country. Increasing

This article is the eighth in a series of abstracts from the Arthur D. Little, Inc., study of Industrial Opportunities in New England. A reproduction of the complete study may be obtained for $2.00 on request to the Research and Statistics Department, Federal Reserve Bank of Boston, 30 Pearl Street, Boston 6, Massachusetts.

foreign competition may adversely affect the future of operations for the assembly of watch movements in New England. The region may benefit from the increasing use of clockwork-operated timing devices, however, because of its relatively strong position in the manufacture of such items. In the electric-clock field, the production of synchronous motors is significant.

Future Possibilities

New England is generally considered an excellent location for the manufacture of instruments because of the labor skills required. Typically, companies in this field have modest power demands. Freight costs are a minor component of total costs, and local manufacturers have not exhibited a tendency to establish branch operations in other areas.

Despite the intrinsic advantages of New England as an instrument-producing area, the region is not leading this field in the United States. The 1947 Census indicated that New England contributed 5.5 per cent of the national total of value added in the manufacture of instruments. Aggressive research and development programs leading to new and improved instruments should allow New England manufacturers of instruments to maintain or better their relative competitive position. Neglect of these activities would probably lead to serious competitive inroads from other regions.

The general character of the field of industrial measuring and controlling instruments is changing. Where in the past such instruments were exclusively mechanical in nature, more and more electronic devices are now being employed. Because of New England's high degree of technological skill in the electronics field, the region's instrument manufacturers have a unique opportunity for real progress. This trend should increase the desirability of New England locations.

The field of atomic energy opens a potentially vast area calling for a completely new concept in instrumentation. The use of radioactive isotopes in instruments is already well advanced in New England, and growth in terms of employment should continue if present leadership is maintained. In addition, nuclear installations will require new types of measuring, process control, health monitoring, and other instruments.

In the medical and surgical field, aside from expected growth through use of radioactive materials, most New England instrument and appliance manufacturers will benefit from planned increases in hospital facilities in the next few years. Better medical care and facilities will result in increased markets for producers of both equipment and supplies. The concentration of medical research facilities in New England should promote the manufacture of medical instruments and equipment.

The field of optics also holds substantial future promise for New England instrument manufacturers. New developments in optical devices and instruments, such as electronically activated optical instruments for egg candling or for control of new super-weapons, should contribute to future sales and employment.

In the photographic field, one aggressive development firm would improve New England's position. In the manufacture of office duplication devices, the opportunity exists for developing a low-cost, high-quality device superior to those now on the market.

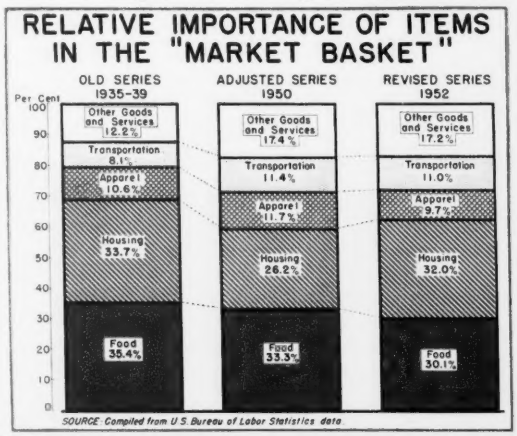
New Consumers' Price Index

THE GOVERNMENT'S new consumers' price index has made its bow. Three years in the making, the revised index covers prices of more products in more cities and is based on an up-to-date pattern of spending among the families of wage earners and clerical workers.

The new index is conspicuously different from its predecessor by appearing much lower. It is a percentage of average prices during the years 1947-1949, while the other was based on 1935-39 prices. The revised index has the same base period as the new wholesale and spot market price indexes.

The revised consumers' price index has been expanded to include more than 300 prices. For the first time the tabulation deals directly with costs of home ownership and maintenance, used cars, and restaurant meals. Several new group indexes are being published, such as Reading and Recreation and Medical Care.

The "market basket" of the consumers' price index consists of a fixed selection of goods and services whose prices are regularly recorded. Each of the items in the market basket has an assigned "weight," or relative importance. The effective weight of various items, however, varies with changes in price. The accompanying chart shows the average effective weight of various groups of items during the 1935-39 period, and during 1950. Assigned weights are shown for the revised index. They are based on patterns of expenditure which prevailed in 1952.

Prices are now collected from cities representative of all urban places, large and small, whereas the previous indexes used data primarily from large cities. City indexes will be issued for 20 large cities. Boston is the only city in New England which will have an index, and it will be published quarterly.

There is now a continuous series of consumers' price indexes on a 1947-49 base dating back to 1913. The series is composed of the "old series" from 1913 through December 1939, the "interim adjusted" index from January 1940 through December 1952, and the revised index from January 1953 forward. By Presidential request, the old series on a 1935-39 base will also be published according to the old technique through June 1953.